



U.S. DEPARTMENT OF  
**ENERGY**

**Nuclear Energy**

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## **DOE-Idaho**

**Overseeing legacy cleanup,  
and growth of world-class energy  
and national security research**

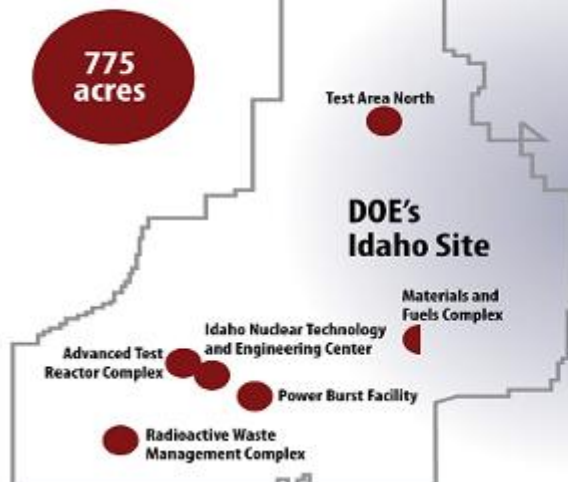
**Richard Provencher  
Manager**

**DOE Idaho Operations Office  
November 17, 2010**

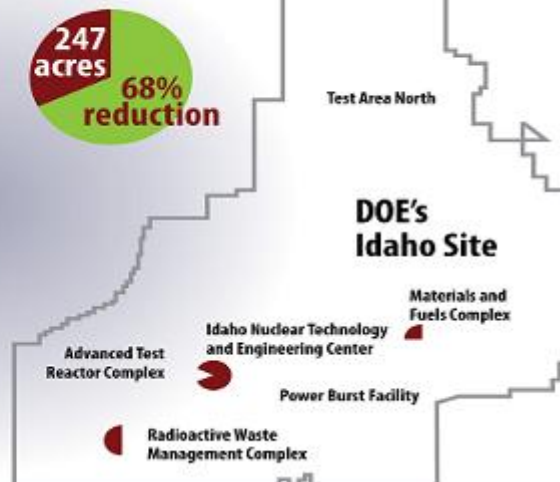


# State of the cleanup (2005 vs. 2011)

**ICP 2005**



**ICP in 2011**

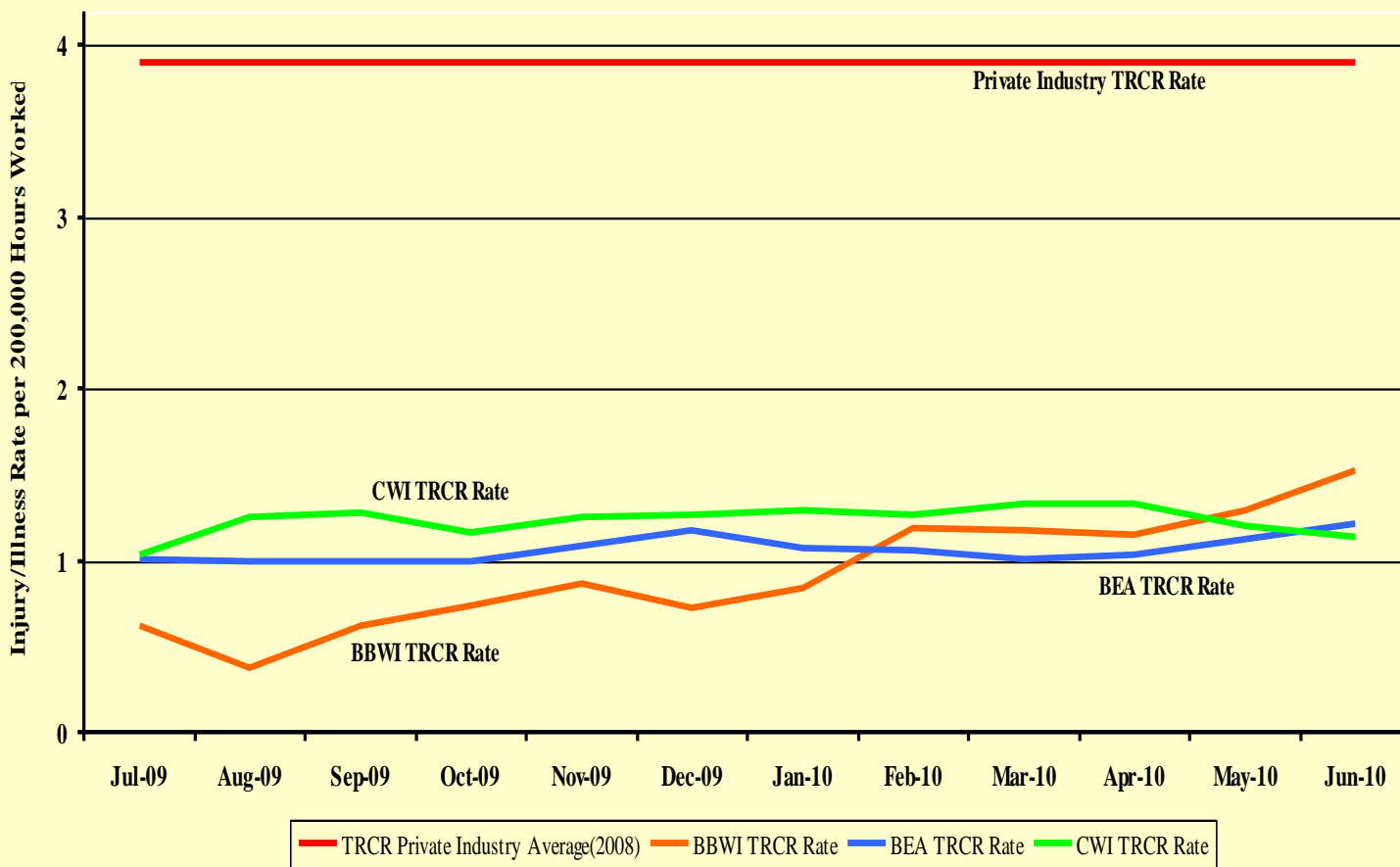


Year	2005 (beginning of contract)	2009 (Actual)	2010 (goal)	2011 (goal)
Acreage	775	658	411	247
Buildings and Structures square feet (ft2)	3,635,948	2,299,319 (includes 100,067 ft2 of NE liability transfers)	2,196,900	1,805,367
Cumulative Square Foot Reduction		1,436,696	1,539,115	1,930,648



# Safety at the DOE's Idaho Site

Safety Performance Rate Comparison  
Idaho Site Contractors and Private Industry  
Total Recordable Case Rate (TRCR)





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# U.S. Department of Energy Nuclear Energy Roadmap

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■ **To achieve energy security and greenhouse gas emission reduction objectives, the US must develop and deploy clean, affordable, domestic energy sources as quickly as possible**

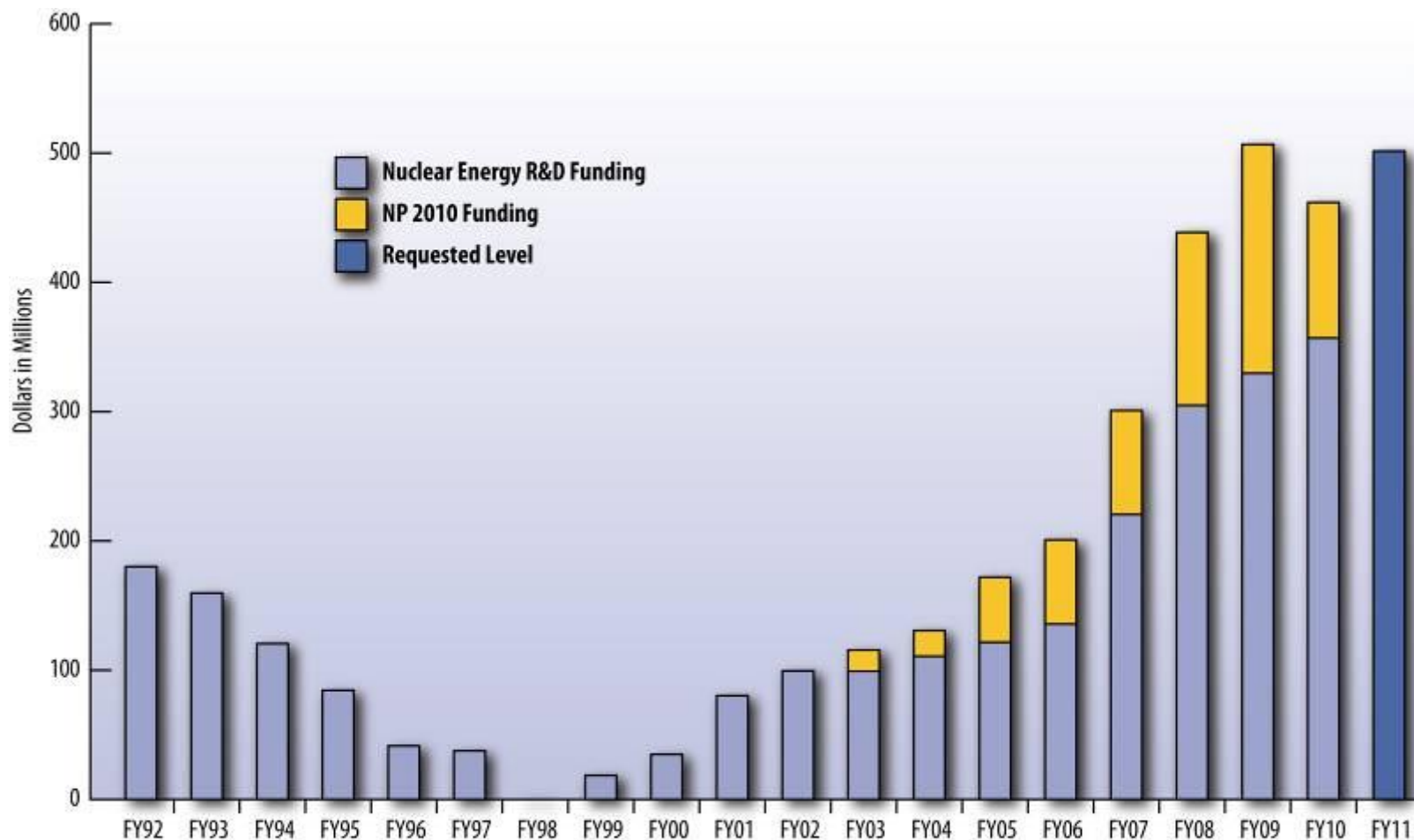
- Nuclear energy will continue to be a key component of a portfolio of technologies (we need all types of energy)

■ **NE Roadmap establishes four R&D objectives**

- Extend the life of current reactors
- Develop improvements in the affordability of new reactors
- Develop sustainable nuclear fuel cycles
- Understand and minimize the risks of nuclear proliferation and terrorism



# Funding for Nuclear Energy Research and Development



FY-2011 represents the President's request

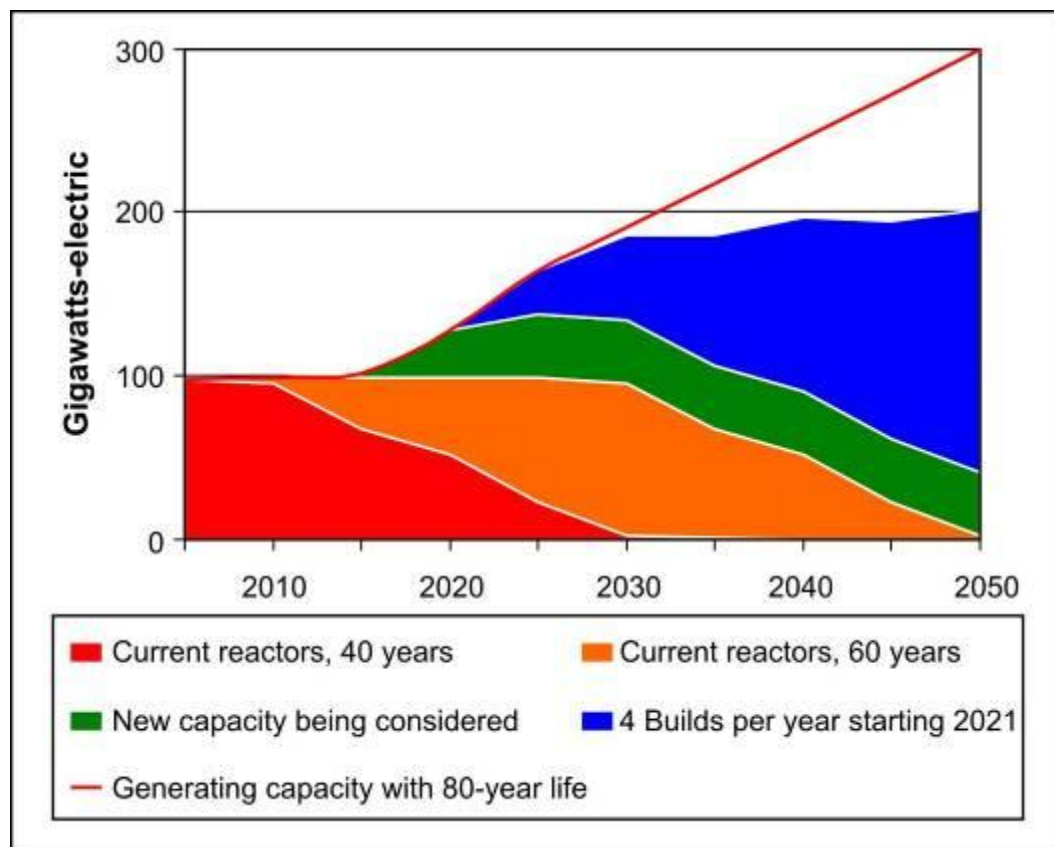


# Objective 1: Life Extension

- **Goal is to provide technical basis to extend plant life beyond 60 years with improved performance**

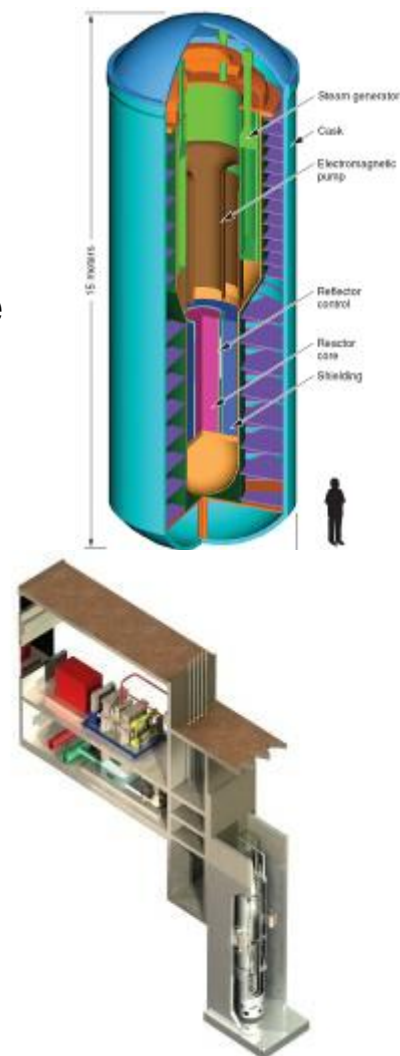
- **Challenges:**

- Aging and degradation of system structures and components
- Fuel reliability and performance
- Obsolete analog instrumentation and control technologies
- Design and safety analysis tools based on 1980's vintage knowledge bases and computational capabilities



# Small Modular Reactors

- **Financing:** smaller per unit cost – don't have to bet the company; could use initial unit(s) to finance future additions
- **Factory fabrication:** potential for significant cost reductions; shipbuilding industry uses figures of merit comparable to 8-to-1 for cost savings where work is done at factory versus on-site
- **Potentially simplified licensing process:** Possibly smaller EPZ; could be air-cooled
- **Nonproliferation:** Advanced SMRs may have a number of attractive features from a nonproliferation perspective.
  - For example, reactors could be shipped to countries with their cores fuelled and sealed, run for long periods of time (e.g., 30 years), and then shipped back with used fuel, thus minimizing spread of material and technology



**POSSIBILITY OF DOE AND/OR DOD SITING OF FIRST UNITS**



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# The Ten-Year Vision

- The INL Ten-Year Site Plan Provides the Ten-Year End State Vision, outlining the investments required for new capabilities, revitalizing existing capabilities, and upgrading related utilities and supporting infrastructure

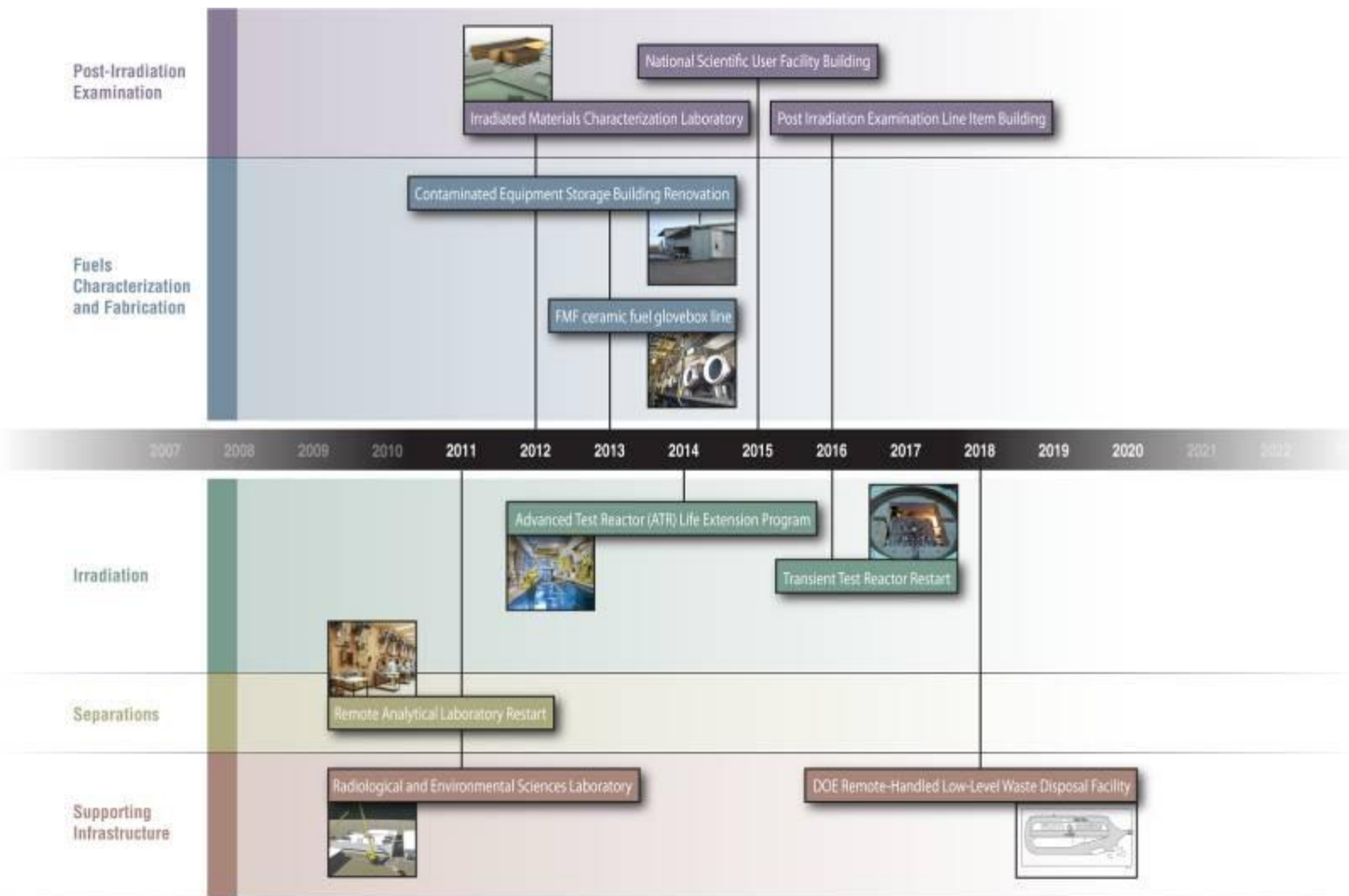


**Contains prioritized resource requirements by Program, with justification**





# Ten-year Idaho National Laboratory facility timeline



# Research programs of national importance

## Nuclear Energy

- ▶ Fuel Cycle R&D
- ▶ Light Water Reactor Sustainability R&D
- ▶ Next Generation Nuclear Plant (NGNP)
- ▶ ATR National Scientific User Facility
- ▶ Space Nuclear

*U.S. National Nuclear Energy Laboratory and an International leader*



## National & Homeland Security

- ▶ Supervisory Control and Data Acquisition (SCADA) Work
- ▶ Grid Reliability and Security
- ▶ Cyber Security
- ▶ Wireless Communications
- ▶ Nuclear Nonproliferation
- ▶ Armor, Explosive Blast Protection

*A leader in critical infrastructure protection and homeland security*



## Energy & Environment

- ▶ Hybrid Energy Systems
- ▶ Clean Energy and Water
- ▶ Bio-fuels and Synfuels
- ▶ Battery Technology
- ▶ Non-traditional Hydrocarbon use

*A leader in developing solutions to energy, resources and infrastructure challenges in the State, Region and Nation*



***Delivering technologies that benefit our communities, state, region and country***

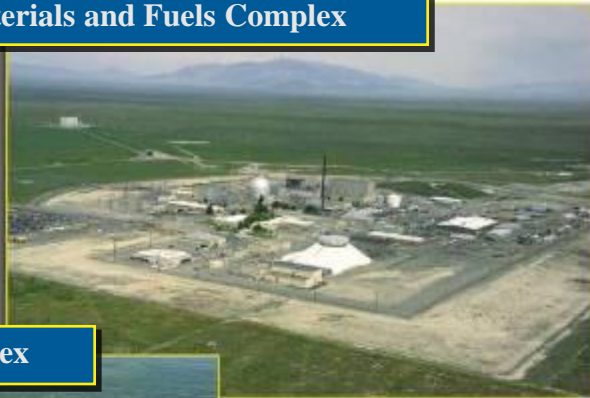


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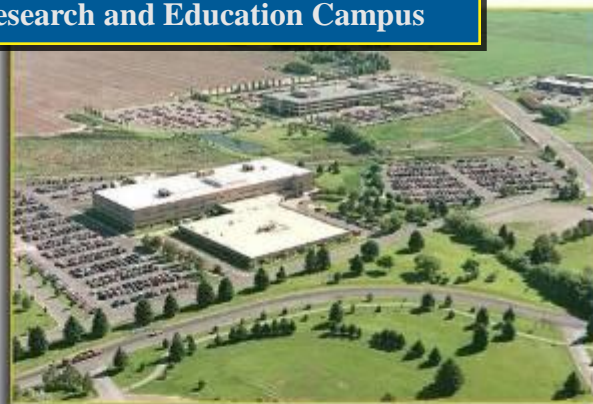
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# Most of the R&D capabilities are focused on three primary site areas

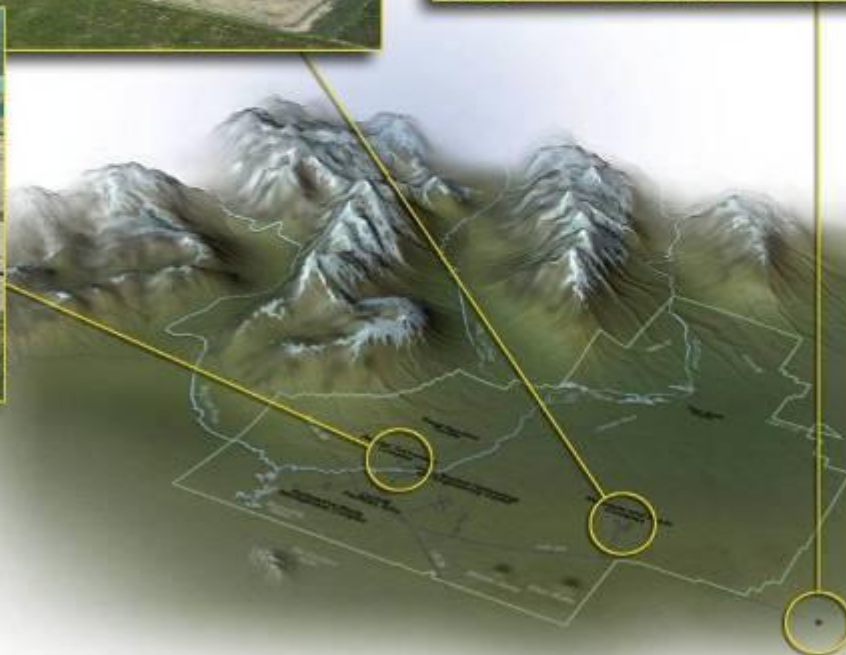
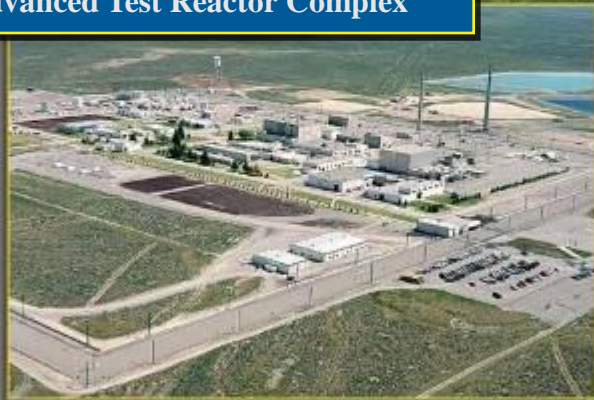
Materials and Fuels Complex



Research and Education Campus

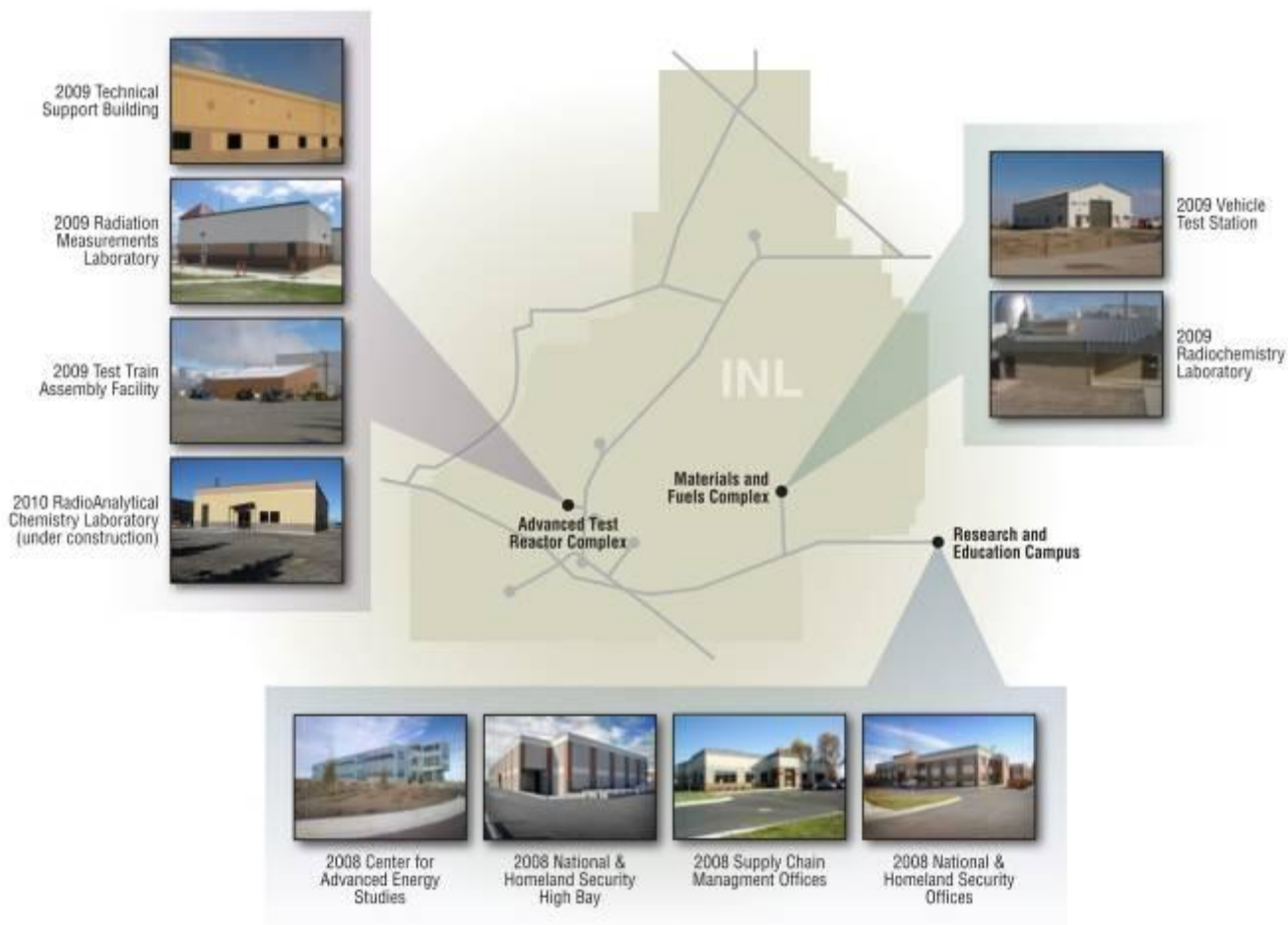


Advanced Test Reactor Complex





# Recent construction at INL



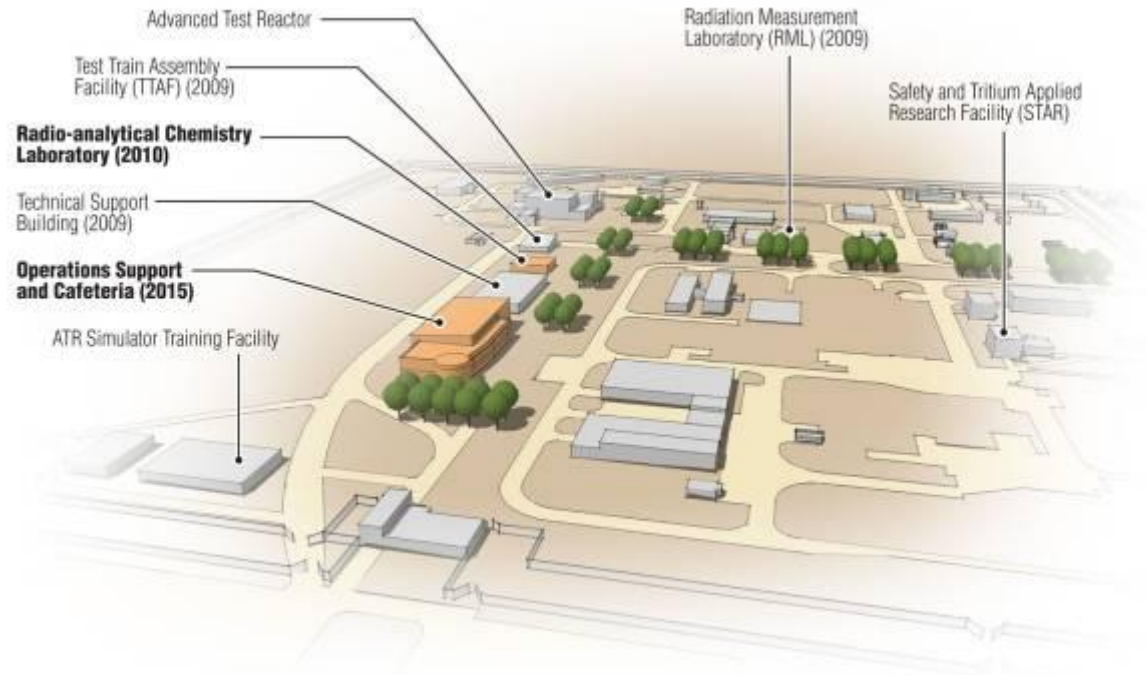




# Advanced Test Reactor Complex

## ■ Significant progress made in ATR capabilities over last 5 years

- Test Train Assembly
- Radiation Measurement Laboratory
- Rabbit system
- Technical Support Building
- Radiochemistry lab to startup this year



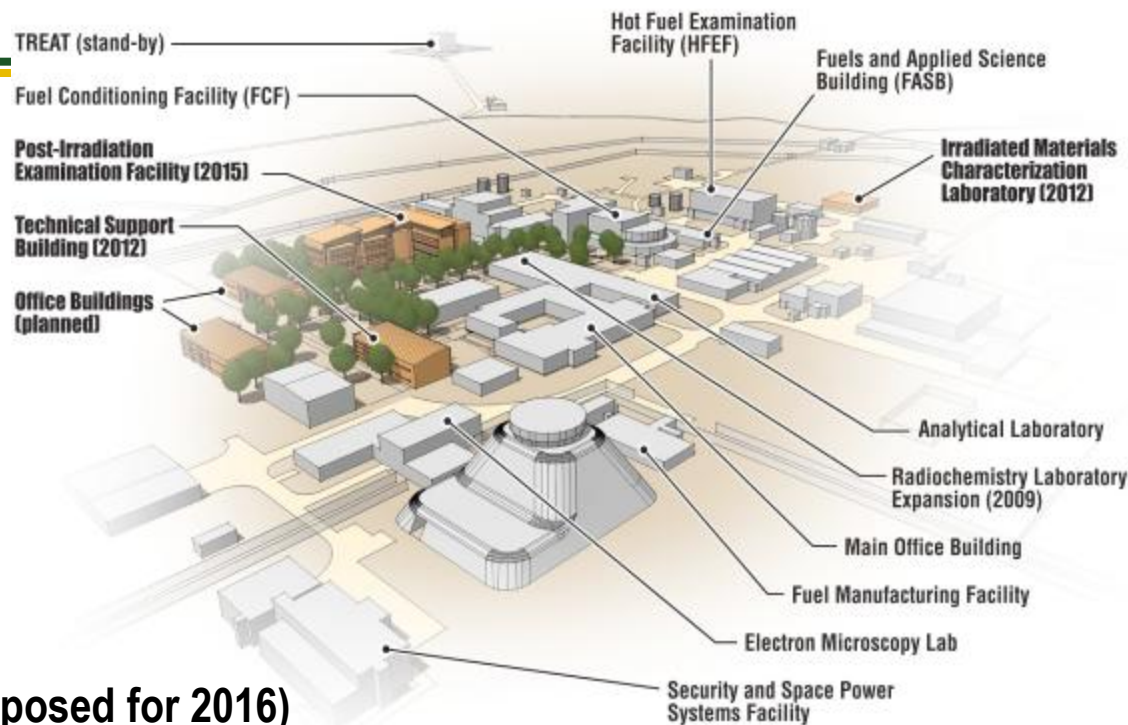
- Future planned enhancements include new loops and in-core instrumentation

**Core Capability – neutron irradiation for materials and fuels testing**

# Materials and Fuels Complex

- **Significant effort focused on optimizing and integrating capabilities**

- Fuel fabrication (metal, ceramics, and eventually composites)
- Fresh fuel characterization
- Fuel and material mechanical testing, visual exams, destructive and nondestructive analyses and exams



- **Transient testing (standby/restart proposed for 2016)**

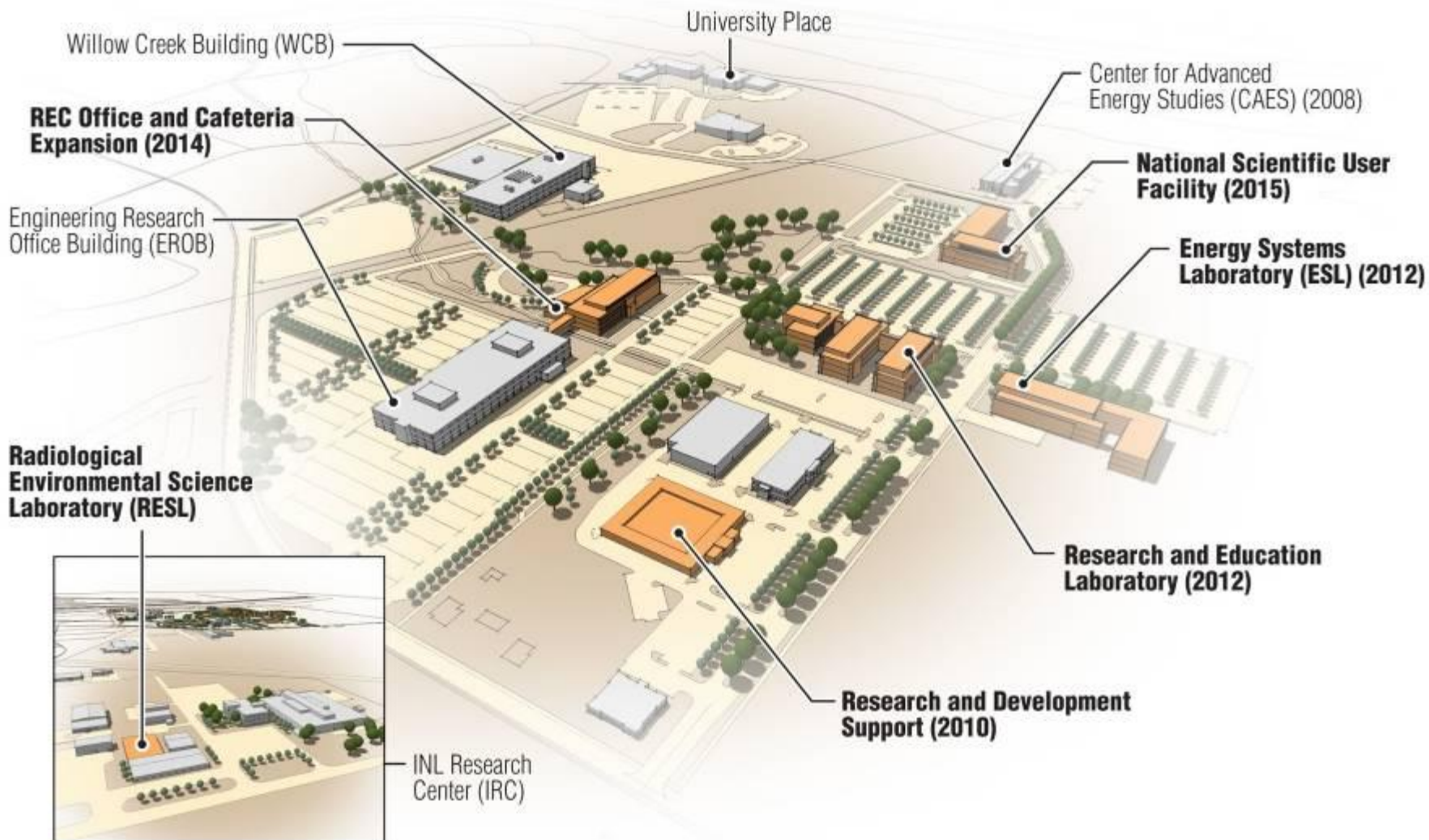
- **Data link to Research and Education Campus, where research using smaller/lower activity specimens will be performed using some of the same instruments**

**Core Capabilities – materials characterization, post irradiation examination, fuels fabrication, electrochemical separations, transient testing**



# Research and Education Campus

## Nuclear Energy



**Core Capability – materials characterization (cold and low activity specimens)**

# **The INL site's economic contributions to our state**

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Nearly 80 percent of INL site employees have post-secondary certificates or college degrees and more than 20 percent have graduate degrees

## **In 2009:**

- The INL site's primary employers paid \$2.5 million to Idaho colleges and universities for the continuing education of their employees
- With 8,016 workers, the INL site was Idaho's second-largest employer, after state government
- Employment at the INL site accounted for 3.5 percent of total Idaho employment and 6.5 percent of statewide economic output
- The secondary effects of INL site operations accounted for an additional 16,133 jobs in Idaho
- The INL site increased personal income in the state by nearly \$2 billion and accounted for 3.5 percent of all personal income in the state
- The INL site accounted for more than \$135 million in personal income taxes, corporate income taxes, sales taxes and other taxes paid to the state
- INL site employees made charitable contributions of \$33.3 million

Source: Boise State University





# Final thoughts –

- Legacy cleanup progress has improved trust and confidence
- INL research and development programs have grown since 2005
- INL is providing real world solutions to energy supply, security and carbon reduction initiatives
- Implementation strategies, cost estimates, and the details are expected to evolve as projects mature with implementation of the vision
- Continued community support is important to INL's success

**We've made significant progress in the infrastructure over the past five years and even more will be made in the next five years.**